Capturing a Solution for Climate Change

*The Role of Carbon Capture and Storage*

*and the*

*Carbon Sequestration Leadership Forum*
Focus of this Presentation

- How close are we to deployment of **carbon capture and storage (CCS)**?
- Do we have the necessary **policy and regulatory frameworks**?
- What is the role of the **Carbon Sequestration Leadership Forum**?
We Have a Global Problem

- ... Both in terms of sustaining economic growth and in taking effective steps to reverse CO₂ growth
- An international effort – by developed and developing countries – is needed
- Solutions require unprecedented level of technical, political and scientific cooperation
CCS is one part – not the whole – of a wider strategy for achieving significant cuts in atmospheric CO$_2$ emissions

- Future carbon-constrained world requires portfolio approach – renewable and nuclear energy, increased efficiencies, and CCS
- CCS makes possible the continued large-scale use of fossil fuels to meet expected surge in energy demand
How CCS Works

CO₂ is:

- Separated from the fuel either before or after it is burned to produced energy. ①
- Compressed and transported by pipeline to injection well. ②
- Pumped underground into a safe, geologic storage area. ③
Does the world have enough storage?

- IPCC estimates about 2 trillion tons but believes it could be larger; Dooley (PNL) and others think it exceeds 11 trillion tons.
- In any case, sufficient to hold emissions for several centuries.
- Many potential storage formations are favorably matched with large-scale CO₂ sources.
CCS in Focus

CCS is not a new or emerging technology – it is already a reality on a small scale

- Decades of operational experience from industrial-scale CCS projects, underground injection of CO₂ for enhanced oil recovery (EOR), and use of analogous technologies, such as acid gas injection and natural gas storage
- These experiences complemented by numerous CCS research projects, partnerships, programs, stakeholder networks
- CCS elements have been separately proven and deployed in various fields of commercial activity
The evidence thus far shows geologic CO\textsubscript{2} storage is safe and permanent

- Underground injection of CO\textsubscript{2} for EOR has taken place for decades
- Three large-scale CO\textsubscript{2} storage projects (Sleipner, Weyburn, In Salah) – injecting 1–2 million tons annually – have operated for several years
- No adverse safety, health, environmental effects have resulted from any of these projects
Pipelines for the safe and efficient transport of CO₂ are a mature technology

- Most existing CO₂-dedicated pipelines (about 4,000 miles) located in western U.S.
- Pipeline-supplied CO₂ for EOR used since the 1970s
- Pipelines have operated safely, with no environmental, health, or safety issues

▲ CO₂ pipeline at Great Plains Coal Gasification Plant in Beulah, North Dakota, USA
CCS in Focus

CCS represents a significant financial investment, but ultimately is comparable in cost to other low-carbon options.

Research goals will reduce energy penalties to less than 30 percent.
A legal and regulatory framework specifically for CCS already exists, but has not yet been adopted by all countries.

- EU Directive on geological storage of carbon dioxide; Japan’s offshore storage legislation; and Australia’s onshore and offshore storage legislation are examples.

- Effective regulatory development process in individual countries needed for successful CCS implementation

- Goal of process should be to:
  - Implement “best practices” researchers believe will allow CCS to be used safely and effectively;
  - Devise adequate provisions for long-term liability
CCS – The Time is Near

- CCS is the only technology that can reduce CO$_2$ emissions from present sources as well as avoid future emissions.
- IPCC has determined CCS can achieve up to 55 percent of reductions needed to stabilize CO$_2$ atmospheric levels in this century.
- IPCC GHG Inventory Guidelines on CCS have already been used by the International Maritime Organisation and EU Emissions Trading Scheme.
Targets Propel Urgency

Examples

- **G8**: “support launch of 20 large-scale CCS demonstration projects by 2010” and reduce emissions 80 percent from 1990 levels by 2050;

- **MEF**: recognize the scientific view that the increase in global average temperature above pre-industrial levels ought not to exceed 2 degrees C
Is industry ready to deliver?

Total - 275

- Active or planned - 213
  - Commercial scale - 101
  - Integrated - 62
- Completed - 34
- Cancelled or delayed - 26
- Input withheld - 2

Status of CCS projects as at 31 March 2009
Prepared for the Global CCS Institute by WorleyParsons
Where are the projects?

Projects by Region
Prepared for the
Global CCS Institute
by WorleyParsons
What are we waiting for?

- Global CCS Institute Report conclusion: there are already 55 planned projects that could be candidates for the G8 objective

But:
- Successful integration of CCS into commercial-scale power plants remains prohibitively costly and such demonstration plants have not yet been built due to lack of funding

- The Global CCS Institute has announced a new global fund of AUD $50 m annually to accelerate the construction of large-scale CCS projects

- Submissions will be considered on a rolling basis – see the Project Funding and Support Program Guidelines: www.globalccsinstitute.com
What are governments doing?

- Recent funding announcements
  - Australia: AUD$2 billion
  - Canada: CAD$3.5 billion
  - European Union: €1 billion plus 300 million EUAs
  - United States: USD$3.4 billion
  - UK: levy on electricity suppliers likely to raise in the region of UK£7.2 - 9.5 billion over a 15-20 year period from 2011, dependent on projects

But:
- Developing countries not yet announced demonstration programs

Ministerial and climate change initiatives focussing on CCS: G8, Major Economies Forum, IEA GHG Programme and the CSLF...
CSLF Mission

“Facilitate the development and deployment of CCS technologies via collaborative efforts that address key technical, economic and environmental obstacles”
CSLF Snapshot

- Formed in 2003; Ministerial-level initiative
- 24 members: EC and nations in every stage of economic development
- Member countries represent over 3.5 bn people . . . 59 % of world population . . . 76 % of world energy consumption . . . 77 % percent of CO$_2$ emissions and economic activity
- Focused on development of improved, cost-effective technologies for separating and capturing, transporting, and long-term CO$_2$ storage
Outcomes of CSLF Ministerial

20 industrial-scale demo projects endorsed by G8 are vital

More could be required by 2020 in developed & developing countries

CCS as a key mitigation technology should be appropriately recognised in international frameworks, including the UN Framework Convention on Climate Change

Developed countries to assist developing countries to achieve the level of CCS required to combat climate change

Support for a CSLF Capacity Building Program

USD$3m donation so far and 30 research and demo projects recognised
How can CCS be “appropriately recognised”?

- Draw on existing work in IEA and CSLF Roadmaps and MEF Technology Action Plans to **develop low-carbon technology element of LCGPs**

- Ensure an efficient institutional system using channels inside and outside the UNFCCC, which allows **CCS projects to be part of country-led mitigation actions** matched to finance

- Word hard to find a solution to the ongoing issue of **approving CCS projects applying for the CDM** and discussion on **the Norway proposal** for a CO2 storage mechanism

- **Adopt IPCC guidelines** on CCS monitoring, reporting and verification to enable recognition in carbon markets and sectoral approaches
CCS: Key Part of GHG Solution

- Essential element in clean energy portfolio where there is continued use of fossil fuels
- Helps ensure long-term energy, economic, environmental security and stability
Consequences of inaction

There are many opinions, but analysis suggests...

“... the projected rise in greenhouse gases “puts us on a course of doubling the concentration of those gases in the atmosphere by the end of this century, entailing an eventual global average temperature increase of up to 6 degrees Celsius”